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21 September 1979

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

(FOUO 3/79)

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WORLDWIDE REPORT

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U.S. SEEKS JAPAN'S COOPERATION IN SCIENTIFIC DEVELOPMENT

Tokyo ASAHI EVENING NEWS in English 11 Aug 79 p 1 OW

[Text] The U.S. is seeking Japan's cooperation in such scientific fields as nuclear energy and space development, according to Foreign Ministry sources Friday. The sources revealed that America has proposed the dispatch to Japan of a large scientific mission led by Dr Frank Press, scientific and technological adviser to the White House, late in September to discuss the details.

Sources close to the Gaimusho (Foreign Office) said that the U.S. request has embarrassed authorities here because of the amount of money involved, and that a reply to the request has not yet been made. Nevertheless, these authorities are planning to receive the American mission, the sources indicated.

The Gaimusho reportedly believes that the request shows that the U.S. has a high opinion of Japan's scientific and technological capabilities. Since the end of the last war, the U.S. has been leading the world in scientific innovations in such fields as nuclear energy and space development by spending enormous amounts of money.

The sources revealed that the U.S. is seeking Japan's cooperation in basic studies in 23 fields unrelated to energy, including research concerning space, the ocean, the environment, and medicine and biology.

The sources say that basic studies on the kind of effect the carbon dioxide in the atmosphere has on the weather could not be done by the U.S. alone.

Under the Japan-U.S. scientific and technological cooperation agreement for the energy field, concluded by Prime Minister Ohira when he visited Washington in May this year, the two countries are to cooperate by investing $1 billion in studies on, and development of, coal liquefaction and nuclear fusion.

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JAPAN

ENERGY AGENCY PLANS ALTERNATIVE ENERGY PROJECT

Tokyo MAINICHI DAILY NEWS in English 15 Jul 79 p 5 OW

[Text] In an effort to reorganize the gas-guzzling economic structure, the National Resources and Energy Agency has compiled a 11-year alternative energy development project, dubbed as "New Apollo Scheme." In the planned period starting in 1980 the government will invest some 2 to 2.5 trillion yen in the project, which is vital to secure independent energy sources.

The four-point New Apollo Scheme calls for overseas coal exploitation and research into new energy technologies such as coal liquefaction and gasification. The other two mainstays comprise a switch from oil reliance in industry and public welfare fields, and the maintenance of safe light water reactors with the backing of established nuclear fuel cycle technologies.

A special corporation to utilize coal from foreign countries' will be set up. It will also function as an agent to buy up coal mining rights which oil majors hold in the developing nations. In the field of coal liquefaction and gasification projects, the expansion of pilot plants and their commercialization are to be advanced through U.S. cooperation. Subsidies will be given to speed up the diversification of energy sources for industry and public welfare needs. In this connection, coal and liqufied natural gas are listed as prior alternative energy sources to replace oil. In the nuclear power development sphere, Japan will aim at developing spent-fuel reprocessing technologies at its own expense.

The agency said that the success of the New Apollo Scheme will produce 38 million kiloliters of oil in 1990, the final year of the project. The figure corresponds to 13.5 percent of the total oil imports which Japan expects to receive this year. To devise financial resources for the project, the agency is considering the imposition of a new energy tax, and an appropriation from oil related taxes.

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JAPAN

MITI APPROVES RESUMPTION OF OI REACTOR'S OPERATION

Tokyo THE JAPAN TIMES in English 17 Jul 79 p 2 OW

[Text] The Ministry of International Trade and Industry (MITI) authorized Kansai Electric Power Co Monday to resume operation of the No. 1 reactor at its Oi nuclear power station in Fukui Prefecture.

The pressurized water reactor, which has an output capacity of 1,175,000 kilowatts, ceased operating Saturday afternoon when control rods were automatically lowered into the reactor after an alarm went off indicating that something was amiss.

MITI said authorization for resumption of reactor operation followed the approval of the Nuclear Safety Commission. The commission gave approval after it had studied the findings of MITI's investigation into the cause of the shutdown.

The ministry, which began investigating the automatic shutdown of the reactor immediately Saturday, Sunday attributed the suspension to a short-circuit in the wiring of the air conditioning. According to MITI, the short-circuit was caused by inadequate insulation in the electric circuits of the venilation and air-conditioning meter in the control room.

The voltage in the reactor protection board decliend consequently, generating a faulty signal indicating that the pumps for the reactor collant had stopped, the ministry said. The ministry reported the finding of its investigation to the Nuclear Safety Commission Monday morning.

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JAPAN

CABINET APPROVES NUCLEAR ACCIDENT GUIDELINES

Tokyo THE JAPAN TIMES in English 14 Jul 79 p 2 OW

[Text] Cabinet ministers Friday approved guidelines for antidisaster measures to be taken in case of an accident at a nuclear power plant. The guidelines were worked out after the accident at the Three Mile Island nuclear power plant in Pennsylvania in late March. In the wake of the Three Mile Island mishap, the Central Disaster Prevention Council, headed by Prime Minister Masayoshi Ohira, drew up the antidisaster guidelines. Shiro Tanaka, director general of the National Land Agency, submitted the guidelines to a cabinet meeting Friday.

The measures include setting up emergency communication lines between nuclear power plants, local governments and the central government; establishing an emergency technical advisory committee within the Nuclear Safety Commission which would advise local governments and other parties concerned in the case of an emergency and the dispatching of monitoring personnel, equipment and doctors.

If there were a chance that radiation would spread to surrounding areas from a crippled nuclear power plant, an antidisaster headquarters headed by a cabinet minister would be set up. It would be under the command of either the international trade and industry minister or the director general of the Science and Technology Agency. The prime minister would command the headquarters in the event of an unusually large accident.

The International Trade and Industry Ministry would make a judgment on the degree and extent of an accident at a nuclear power plant, the Science and Technology Agency would have jurisdiction over an accident at a reactor for scientific research.

The Nuclear Safety Commission would have the power to override a decision by the International Trade and Industry Ministry or the Science and Technology Agency and could start emergency procedures even if the ministry or the agency did not think them necessary.

Under the new guidelines, the work of the emergency technical advisory committee and specialists to be dispatched to accident sites is defined in detail for accidents at a nuclear power plant, at a reactor for scientific research and at a nuclear fuel storage site.

The number of emergency monitoring personnel and the amount of equipment needed in the case of an accident is assigned to each party concerned such as the Science and Technology Agency, Japan Atomic Energy Research Institute, Power Reactor and Nuclear Fuel Development Corporation and power companies.

At present there are nuclear power plants in Fukushima, Ibaraki, Shizuoka, Fukui, Shimane, Ehime and Saga prefectures. Nuclear power plants are under construction in Miyagi, Niigata and Kagoshima prefectures.

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JAPAN

JAPANESE AID IN DETECTING UNDERGROUND TESTS OPPOSED

Tokyo JPS in English 0929 GMT 24 Jul 79 OW

[Text] Tokyo, 24 Jul, JPS--The seismological observatory of the meteorological agency station in Matsushiro town in Nagano Prefecture has been used by the U.S. to detect Soviet underground nuclear tests for over 14 years. This was learned in the course of a survey by AKAHATA based on the material the paper obtained. The meteorological agency has admitted that the station, one of the leading observatories in the world has been assigned this task.

The detection device in this station was set up by the U.S. in cooperation with the meteorological agency and Tokyo University, as part of the U.S. plan for worldwide detection of underground nuclear tests. Similar equipment is also attached to the micro earthquake recording station of Tokyo University in Hiroshima Prefecture. The data obtained in these stations are sent to the analytical research center in the United States regularly, perhaps once in two weeks or one month.

The U.S. financed some 9,500 dollars a year to the maintenance of observatory apparatuses. This shows that the semismological observation is forced to undertake the role of subcontractor of the U.S. in the nuclear armaments race. Strong criticism is expressed by those involved in the task over the meteorological agency's attitude of collaborating with the U.S. [paragraph as received]

AKAHATA on July 23 says that the meteorological agency should establish an independent system of earthquake observations, so that research of earthquakes and science may develop corrected.

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BRIEFS

WATER REACTORS PASS SAFETY CHECKS--Japan's two pressurized water reactors will soon resume operation under authorization by the Nuclear Safety Commission, the Natural Resources and Energy Agency said Tuesday. The agency said the commission approved Monday the agency's reports on safety checks it conducted earlier this month on the two nuclear power plants. The two reactors are the No 1 Ikata plant of Shikoku Electric Power Co, in Ehime Prefecture and the No 1 Genkai plant of Kyushu Electric Power Co in Saga Prefecture, the agency said. Operations have been suspended since the U.S. to check the emergency core cooling systems. [Text] [Tokyo MAINICHI DAILY NEWS in English 8 Aug 79 p 5 OW

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ARGENTINA

TRANSFER OF URANIUM EXPLOITATION TO PRIVATE SECTOR VIEWED

Buenos Aires LA OPINION in Spanish 16 Aug 79 p 10

/Commentary by Martin F. Yriart: "Private Sector Will Take Over Uranium Operations"/

/Text/ The production of uranium by private firms, delays in beginning operations at the Embalse nuclear power plant, and domestic costs of Argentina's nuclear industry were discussed yesterday by Rear Admiral Carlos Castro Madero, an official of the Atomic Energy Commission, in a speech made before the III Corps commander, Gen Luciano B. Menendez, and other authorities at the Cordoba Provincial Energy Enterprise (EPEC), which is in charge of the Embalse plant.

Castro Madero's remarks about these three problem areas are particularly worthy of analysis, considering that in the midst of the energy crisis that Argentina is experiencing, nuclear power is supplying a high percentage of the demand for power and that this percentage will grow in the future, with the incorporation of new atomic power plants.

Castro Madero announced in Cordoba that the "Los Gigantes" uranium deposit, located in that province, has already been turned over to a private firm. This is the first time the CNEA has entrusted the private sector with all of the operations involved in exploration of a deposit. The "Los Gigantes" deposit contains reserves estimated at approximately 1,400 tons of uranium. The firm that was awarded the contract must erect a plant with a production capacity of 150 tons annually. In addition, they must undertake the job of expanding the known reserves through new exploration and prospecting. All of the uranium produced will be purchased by the CNEA.

This formula--which is now being tried out in a relatively small-scale deposit--is the first step in a new CNEA policy that is

intended to decentralize those functions that can be carried out by the private sector, and at the same time to attract investments to the job of prospecting and exploration, since the CNEA is not in a position to obtain by itself all the capital necessary to realize the nation's uranium potential.

To reinforce that strategy, the specifications for developing the Sierra Pintada deposit in Mendoza--which will be the principal support for the nuclear plants in the next two decades--invites the participation of Argentine private enterprises associated with foreign firms, and also requires them to carry out the job of exploration.

The nation's present known uranium reserves are on the order of 27,000 tons, a volume that will meet the requirements of the 6 plants that Argentina will have by 1997, throughout their useful life. After that date, the massive incorporation of atomic plants is anticipated, at a rate of 1,200 to 1,800 megawatts power output annually. Close to 200,000 tons of uranium will be needed to supply these new plants, and it is considered likely that this amount will be found in deposits that have been the object of preliminary studies but which will require new investments in exploration and prospecting.

By that time, it is hoped that the country will be in a position to export uranium. This possibility is presently being evaluated, using political rather than commercial criteria, since it is entirely possible to envision a partnership between Argentina and a country that is more advanced in nuclear technology but which lacks its own uranium resources.

In his remarks, Castro Madero reported on the progress of the Embalse nuclear power plant, which has suffered delays due to disagreements with Canada about the project costs--affected by domestic and foreign inflation--and also by differences in interpretation regarding the responsibilities of CNEA and the Canadian suppliers about the installation of equipment. When completed in 1982, the Embalse plant will have cost about $800 million.

Another subject mentioned by Castro Madero was prices for materials supplied by Argentina, which, in some parts of the plant, turned out to be up to ten times greater than international prices. Castro Madero warned that the system for promoting Argentina's nuclear industry that is currently under study will include incentives for national enterprises, but will also set maximum limits for differences between domestic and international prices.

ARGENTINA

PROSPECTS OF NUCLEAR COOPERATION WITH BRAZIL IMPROVING

Buenos Aires LA OPINION in Spanish 17 Aug 79 p 13

/Commentary by Sergio Ceron: "Nuclear Cooperation Gives Latin American Countries Negotiating Power"/

/Text/ With doubts cast on its dream of becoming an emerging power in the coming decades, with its economic and social processes threatened by the crisis caused by the burden of oil prices on domestic costs, and anxious to develop new sources of energy, Brazil seems to be hinting that it has decided to join a process of nuclear cooperation on the South American continent. At least, this can be surmised from statements made hours ago by Itamaraty spokesman Bernardo Pericas and reported by the international wire services.

Pericas admitted the possibility that his country might sign a nuclear cooperation agreement with Argentina and said that a couple of years ago, the Buenos Aires government, through its National Atomic Energy Commission (CNEA), had made statements to this effect "although expressed in vague terms."

Itamaraty has a poor memory. At the 20th Conference of the International Atomic Energy Organization in Rio de Janeiro in 1976, CNEA's president, Rear Admiral Carlos Castro Madero, proposed the formation of a Latin American body that would lean towards the gradual integration of scientific knowledge and technology. Obviously, achieving that objective would have accorded the continent an advantage that it presently lacks: the ability to negotiate with the seven nations that export nuclear technology--the members of the "London Club."

The Buenos Aires initiative clashed with Brazil's hesitance--conducted in the conference antechambers--and also with the express opposition of Mexico, which was to some extent a spokesman for the American lobbies promoting enriched uranium technology for the power plants.

Brazil, which had signed a nuclear agreement with the Federal Republic of Germany a year earlier, was nurturing the decision--through that agreement and within the space of a decade--to become the leader of the continent. Although it has been practically frozen for 4 years--the agreement provides for the construction of eight nuclear power plants, one uranium enrichment plant and another for producing plutonium, along with the transfer of the resulting technological package. Facing estimates by some circles that Brazil was at least 10 years behind Argentina, Brazil's leadership class glimpsed the possibility of filling the gap in a new demonstration of its strength and daring.

But the Carter administration's policy opposed "nuclear proliferation." Later, the serious results of the oil crisis--in its financial aspects--posed a question mark, at least, over the feasibility of the Brazilian plan.

The anticipated cost of $30 billion to finance the ambitious nuclear plan creates all sorts of doubts in connection with the financial groups that should have contributed to its materialization. With a foreign debt that hovers around $50 billion, an annual debt service anticipated for 1979 of approximately $8.5 billion of this money, and a foreign trade deficit of no less than $1.5 billion, Brazil is no longer an investor's paradise. At the close of the 70's, that image is tending to weaken--an image that nurtured the dreams of greatness on a world-wide scale of some of the nation's leaders.

The enormous and deserving efforts made between 1968 and 1979 to develop Brazil have borne their fruits, but these fruits appear to have reached a limit of growth that will be difficult to repeat. Perhaps the 80's now will not be the decade of the "Brazilian miracle."

At a meeting held by the Club de Roma in Rio de Janeiro a few days ago, 2 July to be more exact, Felipe Herrera, former president of the IDB, termed "absurd" the conflict between Argentina and Brazil over the Corpus and Itaipu dams. Instead, he asserted, the two nations, like the rest of Latin America, should coordinate their efforts to achieve integration at all levels. If they were economically integrated, "they would not be suffering the problems of the energy crisis."

"The nations of this region should reach an understanding regarding the collective use of their natural resources," maintained Herrera, "strengthening agencies such as the Latin American Energy Organization (OLADE), whose objective would be to create an energy common market."

But other interests should be reconciled, not merely regarding the utilization of their natural resources. In our opinion, it is necessary for the Latin American countries to know how to integrate their scientific knowledge and technological aptitudes. Otherwise, they will remain dependent upon the centers of supply and will not have even the power to negotiate with banking groups and multinational firms for the loans they need to develop, nor the capacity to assimilate the technology and expand their industrial capacity.

Argentina, whose international policy in the past few decades may not have maintained the clarity and coherence needed, knew, on the other hand, in matters of nuclear policy, how to establish a policy line that has been maintained throughout this period. In July of 1977, when it finalized the agreement to build the Peruvian atomic complex, it established the first precedent in the world of developing nations that are promoting the transfer of technology in that advanced discipline. That action placed it almost at the doorstep of the exclusive London Club, and at the same time, it constituted the most important event ever recorded in that field in Latin America, "a posteriori" the initiation of operations at the Atucha nuclear plant.

It was by no means an isolated event. Castro Madero said this at the Inter-American Nuclear Energy Commission (CIEN) meeting, which was held in Lima at that same time. Speaking before the South American journalists, he maintained that nuclear development was the only alternative to the energy crisis which was already scourging the world at that time. His proposal was specific: "The countries of this region need to assist each other with mutual rssearch, training and transfer of nuclear power technology, and to adopt ambitious plans in this area." The CNEA's seriousness and efficiency in carrying out its timetable for work in Lima is the best proof of Argentina's policy of cooperation. Apparently it is the key to negotiations being carried out opportunely with Uruguay, Ecuador, Venezuela and Paraguay. Shortly after the Brazilian foreign minister's visit to Caracas a few days ago--during which the intention of the local and the Brazilian governments to exchange information about nuclear subjects was announced--Argentina signed an agreement with Venezuela covering the development and utilization of experimental and power reactors, production of isotopes and their applications, prospecting for minerals of nuclear interest, reciprocal supply and sale of nuclear materials and exchange of experts and technical documentation.

Uruguay is also joining in that policy of cooperation and scientific and technological exchange. The new annual plan of action that is being put into effect--within the framework of the

existing agreement on this matter--will give a greater boost to the task of integration.

Parallel to the growth of this activity, the Uruguayan government is encouraging other projects. During a visit a few days ago, that nation's army commander-in-chief, Lieutenant General Queirolo, was given information about Argentina's latest technological and industrial advances in the area of weapons. But according to versions that are unconfirmed in official circles but persistently published on private levels, a detailed proposal may have been made regarding the possibility of building the Colonia-Buenos Aires bridge within a relatively short time. A firm from the Federal Republic of Germany may have offered to undertake this project without requiring any contribution from the governments of the two nations. In exchange, the company would obtain the toll concession for a certain length of time.

In short, the important thing about a policy of integration is that when one branch of economic or scientific activity takes the lead, it tends to mobilize all the rest simultaneously.

The ideal is to achieve integration at the highest continental level. Brazil's presence undoubtedly would accord Latin America the greatest possible ability to negotiate with the developed world. Although Itamaraty must always be taken with some reservations, it is possible that the financial straits being faced by that country will lead it, in the end, to understand that its fate will be to share the future with the rest of the region.

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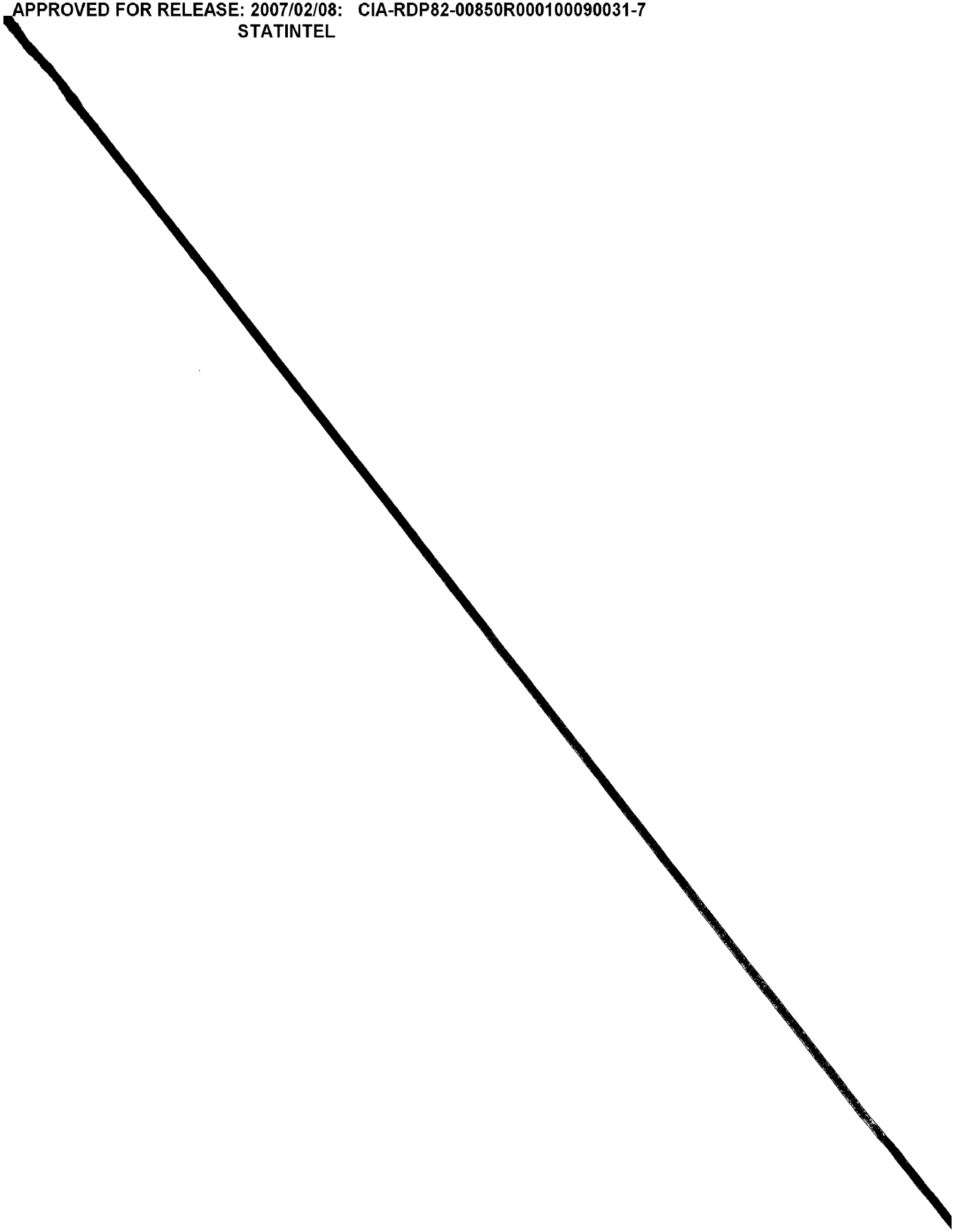

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STATINTEL

GERMAN DEMOCRATIC REPUBLIC

NEW LAW ON TRANSPORTING RADIOACTIVE MATERIALS DISCUSSED

East Berlin ISOTOPENPRAXIS in German Vol 15 No 2/3, Feb/Mar 79 pp 70-73, manuscript received 20 Sep 78

[Article by W. Birkigt, E. Mueller, and F. Nitsche, GDR State Office for Atomic Safety and Radiation Protection. W. Birkigt is also a member of the Commission for Transport of Dangerous Goods, GDR Ministry for Transportation: "On the Introduction of the New 'Order on the Transportation of Radioactive Materials--ATRS'"]

[Text]--INIS DESCRIPTORS:

German Democratic Republic; IAEA; international regulations; packaging; packaging rules; radioactive materials; transport regulations

0. Introduction

The "Order on the Transportation of Radioactive Materials--ATRS" [1-4] has long served as legal basis for the solution of the packaging and transport problems in nuclear technology in the GDR. A revision and a restatement is now needed, because both the international regulations, which were published by the Atomic Energy Authority (IAEA) in Vienna,[5] and other national and international regulations for the carriers on the transport of dangerous goods exist in a different form, or have recently been revised.

For example, the regulations RID* and ADR were issued in 1977, and SMGS Appendix 4 Table 10 on 1-4-1978. The national regulations TOG, SFO and OLTG, which must always be observed and applied in association with the ATRS, will presumably be published in a revised form in 1979.

A report is given below on the new edition of the ATRS,[6] which came into force on 1 August 1978, and its relationships to international and international regulations, as well as its significance for the transport of radioactive materials in the GDR.

* The expansions of the abbreviations will be given in the Appendix.

1. The IAEA Regulations of 1973[7]

The safety principles for the Regulations for the Safe Transport of Radioactive materials of the IAEA were not modified in the revised 1973 edition.

By means of suitable regulations, the transport of radioactive materials will be organized in such a way that it would differ as little as possible from the transport of other dangerous goods. The hazards induced by radioactive and fissile materials are:

--external irradiation
--internal irradiation through inhalation, ingestion or wound contamination in case of emergence of radioactive materials from the packages
--criticality
--heat evolution in case of highly active materials.

The regulations should protect the population, the transport personnel and the environment from the hazards of radiation and criticality. This protection is to be achieved by the combination of:

--limitation of the package contents as a function of the type and activity of the content
--package construction, and
--simple instructions for the handling, storage and loading or stowage during transport,

while in the regulations, concrete indications are furnished on the shielding and permissible equivalent dose rates, the safe seal of the radioactive material, the evolution of heat and safety under the aspect of criticality. The regulations contain provisions for the construction and tests on packaging and packages, and instructions on the necessary licenses.

The following modifications or supplements were introduced in the 1973 IAEA Regulations:

1. Differentiation in the group reclassification of radionuclides in individual values A_1 and A_2 for each radionuclide; A_1 and A_2 are the maximum permissible activities for a package of the type A, while A_1 is for materials in a special shape and A_2 for any materials. Other limit values are expressed as fractions or multiples of A_1 or A_2.

2. Subdivision of the materials of low specific activity into I and II (low specific activity material-LSA I and LSA II).

3. Introduction of low-level solid radioactive material (LLS).

4. Introduction of packages of the type B(U) and B(M), which indicates the markings for a large source; U means unilateral, that is, a package of the type B(U) requires in international transport only unilateral approval on the part of competent authorities of the country of origin, M means multilateral, that is, a package of the type B(M) requires approval from the authorities of all the countries involved in the transport.

5. Establishment of the transport index as equivalent dose rate at 1 m distance from the outside of the package, instead of 1 m from the center.

6. Increase of the maximum permissible transport index of the category II-GELB from 0.5 to 1.

7. Increase of the maximum permissible equivalent dose rate on the outside of the packages from 200 mrem/h to 1000 mrem/h for transports as sealed loads with additional conditions.

8. Introduction of the large container (freight container) concept, and the instructions related therewith for the transport index.

9. List of special examples for package specimen for fissile materials (for NSK II and III) (NSK = nuclear safety class).

10. Establishment of a code for license characteristics.

11. Further modifications of details, such as for example, the introduction of alpha emitters of low toxicity and higher limits for natural and depleted uranium, as well as natural thorium in respect of the permissible surface contamination.

2. Revised Draft of ATRS

The revised draft of the ATRS is characterized by the following facts:

--The modifications of the IAEA prescriptions were introduced;
--The ATRS No 1 and No 2 were combined;
--In accordance with the GDR Standard "Units of Physical Quantities," the SI units were introduced, while approximation was carried out according to the precision of the previous units, and the old units were indicated in parentheses after the new SI units.

The main structure and the basic classification of the former ATRS No 1 was maintained. The new edition contains the sections

--I. Range of Validity and Review of the Transport Measures
--II. Classification of the Radioactive Materials for the Transport
--III. Requirements for Packaging and Packages
--IV. Requirements for the Transport
--V. Regulations for License, Obligations for Warning and Information

--VI. Extraordinary Results in the Transport of Radioactive Materials
--VII. Traffic Extending Over the Borders into Other Countries
--VIII. Penalties and Final Provisions

and the required definitions, limits, trial provisions, etc, are summarized in the appendices.

The classification of the radioactive materials given in Section II is consistent in the numbering with that of the sheets in the international regulations, while the formal deviation in items 9 and 10 of paragraph 4 will be discussed further on. The packaging regulations are classified strictly according to the division of radioactive materials, each class of materials is assigned a paragraph of the packaging regulations (but for fissile materials, 4 paragraphs). Paragraph 5 "General Requirements for Packaging and Packages" is valid for all packages, while the last items 11 to 13 with provisions for sealing, classification into the individual radiation categories and the characterization of the packages are not to be applied for individual types of packages. In the subsequent sections of the ATRS, it was not possible to adhere to the strict classification of the radioactive materials, these sections contain general provisions.

In view of the comprehensive contents, the new ATRS is naturally very extensive and complex. Simplifications in the regulatory work of the ATRS would only be possible at the cost of considerable deviations from the recommendations of the IAEA and the other international transport regulations. The exclusion of separate problem areas (for example test instructions) from the appendices and their inclusion in the TGL does not represent any advantage for the user, since there would then be no separate and complete presentation of the transport regulations, and the uses would be forced to refer to several documents.

3. Review of the Provisions for the Individual Classes of Materials

The following statements will provide a brief review of the requirements for the transport of the corresponding classes of materials, though this summary presentation does not claim in any way to be complete.

3.1. Empty Packages

Packages are considered empty when the internal contamination does not exceed 100 times the permissible external contamination. Empty packages should be marked as such, radiation warning signs or old danger symbols must be removed or covered. The equivalent dose rate on the outsides of the empty packages should not exceed 0.5 mrem/h. There are no special restrictions for the transport, permits are not needed.

3.2 Manufactured Articles of Natural or Depleted Uranium or Natural Thorium

Manufactured articles of natural or depleted uranium or natural thorium must have a resistant envelope, the packages should satisfy the general

requirements, while the packaging functions may be assumed by the manufacturers themselves. The equivalent dose rates on the outsides of the packages should not exceed 0.5 mrem/h. No special restrictions are imposed for the transport, permits are not needed.

3.3. Radioactive Materials of Low Activity

Radioactive materials of low activity are materials with activities per package up to $10^{-3}A_1$ or $10^{-3}A_2$ or $10^{-4}A_2$ for liquids (tritium is not included in this simplified category), containing less than 15 g fissile material. The packages must satisfy the general conditions, the marking RADIOACTIVE must be visible when the package is opened. The equivalent dose rates on the outsides of the package should not exceed 0.5 mrem/h. No special restrictions are imposed on the transport, no special permits are needed.

3.4 Radioactive Materials as Functionally Needed Element of Equipment

Radioactive materials as functionally needed elements of equipment may have activities up to $10^{-2}A_1$ or $10^{-2}A_2$ for solids, $10^{-3}A_2$ for liquid materials, and $10^{-3}A_1$ or $10^{-3}A_2$ for gaseous materials, while 10 to 100 times the above mentioned activities are permissible, and the content in fissile materials should not exceed 15 g. The equipment must be marked with the indication RADIOACTIVE. The packages should satisfy the general conditions. The equivalent dose rates at 10 cm distance from the unpacked instruments should not exceed 10 mrem/h and on the outside of the packages, it should not exceed 0.5 mrem/h. No special restrictions are imposed for the transport, permits are not needed.

3.5. Radioactive Materials of Low Specific Activity I (LSA)*

Materials of low specific activity I are:

a. Ores and ore concentrates of U_{nat} or Th_{nat}

b. Nonirradiated natural or depleted uranium, natural thorium and their compounds

c. Tritium oxide in aqueous solution up to 10 Ci/l

d. Radioactive materials with uniformly distributed activity up to 10^{-4} A_2/g, while this value may not be exceeded, for example by increase of the concentration of activity by the possible unfavorable effects of conditions in the transport (dissolution with subsequent recrystallization, precipitation, evaporation, combustion, etc)

e. Contaminated objects with ten times the normally permissible external contamination, while no concentrations of activities higher than 10^{-4} A_2/g should arise with the possibly unfavorable effects of conditions in the transport. The additional conditions with regard to the possible

* LSA = low specific activity

occurrence of increases in the concentration of activity in the materials cited under items d and e were reviewed and were the cause of the separation of the radioactive materials of low specific activity I and II. They represent stricter requirements, hence the transport of these materials in (commercial) packages must not be limited to the sealed loading.

Two possibilities arise for the transport of radioactive materials of low specific activity I:

--general transport
--transport as sealed load

a. General Transport

The packages must satisfy the general conditions, they must be sealed and be provided with danger signs designating radioactive materials according to the assignment to the radiation category I, II or III.

For the transport, the following should be considered:

--indication of the means of transport
--ban on combined loading with dangerous goods
--no transport in sections occupied by passengers (except for accompanying personnel
--distance from photographic materials
--limitation of the number of transport code numbers to 50.

Permits are not needed.

b. Transport as Sealed Load

Transports in sealed loads are possible in solid commercial packaging, in large containers or loose in bulk, for tritium oxide in aqueous solution the limit is 50,000 Ci and for liquid and gaseous materials, 100 A_2.

When using packages, the latter must be marked RADIOACTIVE (LSA I). Equivalent dose rates on the outside of the packages up to 200 mrem/h and in special conditions up to 1000 mrem/h are permissible. The equivalent dose rate on the outside of the means of transport should not exceed 200 mrem/h, and at a distance of 2 m from the vertical exterior, 10 mrem/h.

In the case of loose goods (air transport not permitted) no radioactive materials should reach the exterior of the means of transport. The latter must be marked.

3.6. Radioactive Materials of Low Specific Activity II (LSA II)

Materials of low specific activity II are:

a. Radioactive materials with uniformly distributed activity up to 10^{-4} A_2/g

b. Contaminated objects with contaminations up to 1 μCi/cm^2 for β-emitters and 0.1 μCi/cm^2 for α-emitters.

These materials should only be transported as sealed load, and for tritium oxide, the limit is 50,000 Ci and in the case of liquid and gaseous materials, the limit is 100 A_2. Packaging types should be used, satisfying the general requirements, and they must be marked RADIOACTIVE (LSA II). On the outside of the packages, equivalent dose rates up to 200 mrem/h are permissible, and in special conditions, up to 1000 mrem/h. The means of transport should be marked. No permits are needed.

3.7. Radioactive Materials of Low Activity (LLS)*

These materials were recently included in the IAEA Regulations, and are important with regard to solidified wastes or activated materials. Solid radioactive materials of low activity are:

a. solids with a uniform distribution of activity up to $2.10^{-3} A_2/g$ and additional requirements for the solubility

b. contaminated objects with contaminations up to 20 μCi/cm^2 for β-emitters and 2 μCi/cm^2 for α-emitters.

Solid wastes should only be transported in sealed load. The packages should satisfy the general requirements and according to tests for type A packages should prevent the loss of the radioactive content and the increase in the increase of the equivalent dose rates (solid industrial packages). These packages should be marked RADIOACTIVE (LLS). The maximum equivalent dose rates on the outside of the package should be 200 mrem/h (transport code number up to 10), and in special conditions, 1000 mrem/h. The equivalent dose rates on the outside walls of the means of transport should not exceed 200 mrem/h, and at a distance of 2 m from the vertical external walls, 10 mrem/h. The means of transport should be marked. Permits are not needed.

3.8. Radioactive Materials of Medium Activity

Radioactive materials of medium activity are designated in international regulations, which are classified in a "sheet form," as "Radioactive materials in Type A packages." The activity limit per package is A_1 for materials in a special shape and A_2 for any materials. The following requirements should be satisfied:

--Transport in Type A packages with danger signs corresponding to the radiation categories I, II or III;
--Bans on combined loading with dangerous goods;
--Distance from photographic materials;

* LLS = low level solid

--Transport forbidden in sections occupied by passengers (except for accompanying personnel);
--Limitation of the sum of transport code numbers to 50 (outside transports as sealed load);
--Marking of the means of transport.

Permits are not needed

3.9. Radioactive Materials of High Activity (I)

Radioactive materials of high activity (I) may show per package, activities up to 3.10^3A or 3.10^3A_2 or 3.10^4 Ci. For the transport all the above mentioned conditions must be satisfied for radioactive materials of medium activity. However, packages of the type B(U) or the type B(M) are needed, which should be able to resist in a medium scale transport accident, defined by prescribed tests (9 m fall, 1.2 m fall on baffle, fire test, water submersion test) and the evolution of heat and the effect of radiation should be taken into consideration on the basis of the higher activity. These packages are identical to those of the previous types B I and B II. Packages (specimens) of the type B (U) only require unilateral permit from the competent authorities of the country of origin, which is acknowledged by the authorities abroad. Packages (specimens) of the type B(M) need special measures during the transport; the SAAS or in case of international transport, the competent authorities of the countries involved in the transport must be notified before the transport begins; type B(M) packages with constant gas evolution need a transport permit.

3.10. Radioactive Materials of High Activity (II)

In case of radioactive materials of high activity (II), the above mentioned limits of activities are exceeded. With regard to the provisions for packaging and packages and transport requirements, all the provisions valid for radioactive materials of high activity must be maintained. In addition, the SAAS is to be notified before the transport begins, and notice is to be given to the competent Office of the German State Police. In case of international transport, the competent authorities of all the countries involved in the transport should be informed.

Compared to the international regulations in "Sheet Form" (for example, RID), "Radioactive materials of high activity (I)" according to ATRS paragraph 4, number 9, is not totally identical, formally with "Radioactive materials in type B(U) packages" according to RID Sheet 9, nor "Radioactive materials of high activity (II) according to ATRS paragraph 4, number 10 with "Radioactive materials in type B(M) packages" according to RID, Sheet 10. In the ATRS, the classification is strictly according to the activity of the material, in the RID a classification is taken according to the package used for consignments. The requirements for the consignment packages and the transport provisions are totally consistent, it is only a different form of representation.

3.11. Fissile Materials

The provisions for fissile materials are basically unchanged. Packages for consignment of Nuclear Safety Classes I, II, III are defined. For the Nuclear Safety Classes II and III, examples were reincorporated for package specimens, which would permit the transport of small amounts of fissile materials, and which would not require costly safety proofs when applying for permits for the type of consignment package. The required approval of the package does not depend on the Nuclear Safety Class. The SAAS is to be notified about the transport of fissile materials, and the competent Office of the German State Police should also be informed.

A transport permit from the SAAS is needed for transport of packages of the Nuclear Safety Classes II and III.

4. Prospects

The safety principles for the transport regulations have not been modified and the basic packaging requirements were retained. We should therefore not expect extensive modifications or additional difficulties in the transport of radioactive materials. In the transition provisions, it was established, that the existing permits retain their validity, for international requirements the supplementary measures can be implemented at relatively low cost, so that we need only take into consideration certain procedural changes and slight organizational costs.

By assigning the group classification of the radionuclides and introducing the values A_1 and A_2 for each individual radionuclide, the existing packages can be used better, since in most cases the permissible activity per package is higher.

On the part of the IAEA, there is a plan to revise the IAEA regulations every 10 years, so that the next edition may be expected in 1983. The revision of the ATRS would then be necessary, taking into account the term of introduction in the international regulations of the individual carriers with the corresponding time shift.

In the application of a comparatively complicated regulation, such as given in the ATRS, limiting cases should always be taken into consideration, for which the assignment of the radioactive materials into one class of material or the other is difficult. It is therefore provided to publish examples in the form of problems with solutions for the transport of radioactive materials, which would explain to the users of the ATRS the application of the latter and make it simpler for them.

Appendix

--International Agreement on Railroad Freight Carriage (CIM) Appendix I, International Order on the Carriage of Dangerous Goods by Railroad (RID), Class 7

--European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)

--International Maritime Dangerous Goods Code (IMCO, Class 7, published by the Intergovernmental Maritime Consultative Organization (IMCO) (London)

--IATA Regulation Relating to the Carriage of Restricted Articles by Air, Part 2, Class 7 (IATA: International Air Transport Association)

--Agreement on the International Railroad Carriage of Goods (SMGS),* Appendix 1 to Article 4 Table 10

--Order on the Transport of Dangerous Goods by Railroad, Vehicles and Ships for Internal Navigation--Transport Order for Dangerous Goods (TOG)

--Order on the Handling of Dangerous Goods in Maritime Transport and Port Transshipment--Sea Freight Ordinance (SFO)

--Order on the Transport by Air of Dangerous Goods (OLTG).

FOOTNOTES

1. Law on the Transport of Radioactive Materials--ATRS--of 10-6-1967, GESETZBLATT DER DDR, Offprint No 552.

2. Law on the Transport of Radioactive Materials of 11-2-1971, GESETZBLATT DER DDR, Offprint No 697.

3. D. Richter, ISOTOPENPRAXIS 4 (1968) 37.

4. D. Richter, W. Birkigt: "Erlaeuterungen zu den Vorschriften ueber den Transport Radioaktiver Stoffe hoher Aktivitaet" [Comments on the Regulations of the Transport of Radioactive Materials of High Activity], Report SZS-19/70, September 1970.

5. Regulations for the Safe Transport of Radioactive Materials, International Atomic Energy Agency, Safety Series No 6, Revised Edition, Vienna, 1973.

6. Law on the Transport of Radioactive Materials, ATRS, of 12-4-1978, GESETZBLATT DER DDR, Offprint No 953.

7. G. E. Swindelt: "The Safe Transport of Radioactive Materials, IAEA-PL-568 Budapest," September 1973.

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* Relevant to the railroads of the socialist countries